

WHAT IS CLAIMED IS:

1. A power supply for a developer unit for developing a latent image recorded on an image receiving member with marking particles, to form a developed image, wherein the developer unit comprises a donor member, spaced from the image receiving member, for transporting marking particles to a development zone adjacent the image receiving member; and an electrode positioned in the development zone between the image receiving member and the donor member, the power supply comprising:

a voltage supply that electrically biases said electrode during a developing operation with at least an alternating current voltage and a direct current voltage to detach marking particles from said donor member, forming a cloud of marking particles in the development zone, and developing the latent image with marking particles from the cloud;

wherein said alternating current voltage comprises waveforms having asymmetric and substantially square shapes.

2. The developer unit of claim 1, wherein said alternating current voltage is frequency modulated.

3. A printing machine having a developer unit for developing a latent image recorded on an image receiving member with marking particles, to form a developed image, the developer unit comprising:

a donor member, spaced from the image receiving member, for transporting marking particles to a development zone adjacent the image receiving member;

an electrode positioned in the development zone between the image receiving member and the donor member; and

a voltage supply for electrically biasing said electrode and the donor member during a developing operation with an alternating current voltage and a direct current voltage to detach marking particles from said donor member, forming a cloud of marking particles in the development zone, and developing the latent image with marking particles from the cloud;

wherein said alternating current voltage for both the donor member and the electrode are run at substantially the same frequency without phase shifts.

4. The developer unit of claim 3, wherein said alternating current voltage is frequency modulated.

5. A method of operating a donor member and an associated alternating current biased electrode in a developer unit used for developing a latent image recorded on an image receiving member with marking particles, to form a developed image, the developer having a magnetic brush member and a donor member, the donor member being spaced from the image receiving member, for transporting marking particles to a development zone adjacent the image receiving member; the alternating current biased electrode being positioned in the development zone between the image receiving member and the donor member; and a voltage supply for electrically biasing said electrode during a developing operation with an alternating current voltage and a direct current voltage to detach marking particles from said donor member, forming a cloud of marking particles in the development zone, and developing the latent image with marking particles from the cloud, the method comprising the steps of:

maintaining a relative voltage difference between the magnetic brush member and the donor member by maintaining the alternating current voltage for the donor member and the alternating current voltage for the magnetic brush member at substantially the same frequency without phase shifts.

6. The method of claim 5, wherein said alternating current voltage is frequency modulated.

7. A power supply circuit for a developer unit in an image forming apparatus, the power supply circuit comprising:

at least one oscillator supplying an alternating current electrical signal;  
three output terminals;

three AC drivers connected to the at least one oscillator and each supplying a voltage signal to one of the three output terminals, wherein the signal supplied by each AC driver is of the same frequency; and

at least two DC power sources.

8. The power supply circuit according to claim 7, wherein at least one oscillator generates a frequency modulated square waveform electrical signal.

9. The power supply circuit according to claim 7, wherein the three output terminals comprise a mag roller bias, a donor roller bias and a wire electrode bias.

10. The power supply circuit according to claim 7, wherein the signal supplied by the oscillator is frequency modulated.

11. The power supply circuit according to claim 9, wherein the voltage signals supplied to the mag roller bias terminal, the donor roller bias terminal and the wire electrode are asymmetric with respect to the voltage axis.

12. The power supply according to claim 9, wherein the signals supplied to the mag roller bias terminal, the donor roller bias terminal and the wire electrode bias terminal are in phase with one another.

13. A method of operating a donor member and an associated alternating current biased electrode in a developer unit used for developing a latent image recorded on an image receiving member with marking particles, to form a developed image, the developer having a magnetic brush member and a donor member, the donor member being spaced from the image receiving member, for transporting marking particles to a development zone adjacent the image receiving member; the alternating current biased electrode being positioned in the development zone between the image receiving member and the donor member; and a voltage supply for electrically biasing said electrode during a developing operation with an alternating and direct current voltage to detach marking particles from said donor member, forming a cloud of marking particles in the development zone, and developing the latent image with marking particles from the cloud, the method comprising:

maintaining a relative voltage difference between the magnetic brush member and the donor member by maintaining the alternating current voltage for the donor member and the alternating current voltage for the magnetic brush using waveforms that have asymmetric and substantially square shapes.